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## PERFORMANCE TEST OF PRODUCTION ORENCO "D" BUILT BY THE CURTISS AEROPLANE & MOTOR CORPORATION EQUIPPED WITH WRIGHT 300 H. P. ENGINE

(PERFORMANCE TEST REPORT No. 68)

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Prepared by Engineering Division, Air Service  
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# PERFORMANCE TEST OF PRODUCTION ORENCO "D" BUILT BY THE CURTISS AEROPLANE & MOTOR CORPORATION, EQUIPPED WITH WRIGHT 300-HORSEPOWER ENGINE.

## OFFICIAL PERFORMANCE TEST—SUMMARY OF RESULTS.

AUGUST 26, 1921.

Airplane: Orenco "D".  
No.: P-163.  
Type: I.  
Engine: Wright 300-horsepower.  
Propeller: X-1439.  
Equipped as: ———.  
Weight empty (including water): 1,908 pounds.  
Armament and equipment: 345 pounds.  
Crew: 180 pounds.  
Gasoline: 350 pounds.  
Oil: 37 pounds.  
Weight loaded: 2,820 pounds.  
Weight per square foot: 10.8 (261 square feet).  
Weight per horsepower: 8.55 (330 horsepower at 1,810 revolutions per minute).  
Fineness: 104 Ae—7.4.

Standard altitude in feet.	Climb.			Speed.		
	Time in minutes.	R.P.M.	Rate ft./min.	M.P.H.	R.P.M.	Flow gal./hr.
0	.....	1,520	1,140	139.5	1,810	.....
6,500	6.9	1,515	770	136.5	1,760	.....
10,000	12.1	1,510	575	133.5	1,720	.....
15,000	24.0	1,505	295	125	1,655	.....
20,000	.....	.....	.....	.....	.....	.....
25,000	.....	.....	.....	.....	.....	.....
18,450 <sup>1</sup>	43.0	1,495	100	110.6	1,590	.....
20,250 <sup>2</sup>	.....	1,490	0	90	1,490	.....

<sup>1</sup> Service ceiling.

<sup>2</sup> Absolute ceiling.

Endurance, full throttle: one-half hour at ground and 2½ hours at 15,000 feet.

Minimum speed at sea level (lowest throttle): 64.5 miles per hour.

Landing speed: ———.

### PILOT'S OBSERVATIONS.

This pursuit airplane is easy to fly and very steady for an airplane of this type. With full military load it has a marked tendency to porpoise in taking off. The airplane maneuvers well, but is slightly heavy on the controls, especially on the ailerons, and is very tail heavy in a maximum climb up to 15,000 feet. It is easy to land, and has no tendency to turn on the ground, but rolls a good distance.

The cockpit is very roomy and comfortable, with plenty of leg room, and the visibility is good, especially above. The instruments are well placed and easy to read, with the exception of the tachometer, which is placed on the right side of the fuselage and low down. The pilot must place his head inside and bend over to read it.

The vibration of the engine at cruising speeds is very noticeable, and the veneer on the sides of the fuselage vibrates, especially in the bay where the pilot sits. This is the longest bay.

No change in alignment had to be made after the fittings were bedded, and the accessibility to the engine is better than in the original design. Considerable trouble was experienced with the long-tail skid breaking, but shortening the tail skid remedied this, and also slowed up the landing speed, due to the better landing angle obtained.

LOUIS G. MEISTER,  
Test Pilot.

### DESCRIPTION OF AIRPLANE.

#### DIMENSIONS.

Overall span: 32 feet 11½ inches.  
Overall length: 21 feet 5½ inches.  
Overall height: 8 feet 4½ inches.  
Height at hub of propeller above ground: ———.  
In flying position: 5 feet 1 inch.  
At rest: 5 feet 8 inches.

#### AIRPLANES.

Wing curve: N. A. F., 15; N. P. L., ordinates.  
Sweepback: None.  
Dihedral, degrees: None.  
Stagger: 0 feet 7 inches.  
Total area, including ailerons: 272.94 square feet.  
Gap: 4 feet 4½ inches.

#### UPPER PLANE.

[Including center section.]

Span: 32 feet 11½ inches.  
Chord: 5 feet.  
Area, with ailerons: 150.82 square feet.  
Incidence, degrees U: 1° 30'; L: 1° 45'.

#### LOWER PLANE.

Span: 28 feet.  
Chord: 5 feet.  
Area: 122.12 square feet.  
Incidence, degrees: 1° 30'.

#### AILERONS OR FLAPS.

Number: 2.  
Arrangement: On upper wing.  
Upper length: 8 feet 11½ inches.  
Upper chord: ———.  
Upper area: Each 10.36 square feet.  
Lower length: ———.  
Lower chord: ———.  
Lower area: ———.  
Total area: 20.72 square feet.  
Distance from center of ailerons to longitudinal axis of airplane: 11 feet 11½ inches.

## CENTER SECTION.

Area: 10.34 square feet.  
 Dimensions: 30 inches by  $57\frac{1}{4}$  inches.  
 Contents: Gravity tank.

## STABILIZER.

Area: 14.18 square feet.  
 Setting: ———.

## ELEVATOR.

Area: 14.28 square feet.  
 Distance from leading edge of elevator to center of gravity of airplane: 14 feet  $5\frac{1}{4}$  inches.

## RUDDER.

Area: 7.9 square feet.  
 Distance from leading edge of rudder to center of gravity of airplane: 12 feet  $11\frac{1}{2}$  inches.

## FUSELAGE.

Maximum cross section shape: Rectangle rounded top.  
 Maximum cross section area: 942 square inches.  
 Maximum cross section dimension:  $28\frac{1}{4}$  by  $33\frac{1}{8}$  inches.  
 Distance of maximum section from leading edge, lower plane: 5 feet  $9\frac{1}{4}$  inches.

## LANDING GEAR.

Number of wheels: 2.  
 Tread: 4 feet  $10\frac{1}{4}$  inches.  
 Shock absorbing system: Rubber cord.  
 Braking device: Tail skid.  
 Wheels ahead of center of gravity: 23.1 inches.

## FIN.

Area: 5.51 square feet.

## DISTRIBUTION OF WEIGHTS.

[By pounds.]

Weight empty (with water) .....	1,908
Armament and equipment .....	345
Crew .....	180
Gasoline .....	350
Oil .....	37
Weight loaded .....	2,820
Weight on front wheels (tail skid on ground) .....	2,336
Weight on tail skid (tail skid on ground) .....	484
Weight on front wheels (flying position) .....	2,459
Weight on tail skid (flying position) .....	371
Center of gravity (distance from wheels in flying position) .....	inches.. 23.9
Center line of axle to point of support of tail skid .....	15 feet 2 inches
Provisions for special equipment not carried during test.	

## DESCRIPTION OF POWER PLANT.

## ENGINE.

Make: Wright H.  
 Factory No.: ———.  
 A. S. No.: 13812.  
 Type: Vee-8 cylinder.  
 Number in Plane: 1.  
 Location: Nose of fuselage.  
 Rated horsepower: 330.  
 Rated revolutions per minute: 1,810.  
 Bore: 5.511 inches.  
 Stroke: 5.905 inches.  
 Compression ratio: 5.32 to 1.  
 Weight dry: 632 pounds.  
 Gas consumption: 0.521 pound per horsepower hour.  
 Oil consumption: 0.055 pound per horsepower hour.  
 Weight of water in engine: 57.9 pounds.

## IGNITION.

Battery or magneto: Magneto.  
 Make: Dixie model 800.  
 Number: 2.  
 Advance, degrees: 25°.  
 Gas interrupter: 0.020 inch.  
 Distributor: Carbon brush contact.  
 Plugs, make: Inside vee: A. C.; outside vee: Mosler.  
 Type: A. C. metal body porcelain insulator; Mosler metal body mica insulator.  
 Gap: 0.020 inch.

## CARBURETORS.

Make: Stromberg.  
 Type: NA-D6.  
 Number: 1.  
 Setting jet: 32  
 Choke:  $1\frac{1}{8}$  inches.  
 Compensator: None.  
 Gas drains: One into air intake vertical.  
 Air intake: Vertical.  
 Mixture control: ———.  
 Effect to altitude: 18,000 feet.

## RADIATORS.

Make: Curtiss.  
 Type: A. S. Standard 5-inch core; drawing M. 1317.  
 Number: 1.  
 Position: Nose of fuselage.  
 Frontal area core: 3.45 square feet.  
 Depth: 5 inches.  
 Length: 36 inches overall.  
 Width:  $28\frac{1}{2}$  inches overall.  
 Radiator surface: 170 square feet.

Temperature adjustment: Shutters.

Water capacity: 7.29 gallons.

Flow, gallons per minute: 34.3.

Thermometers, make: Boyce distance reading.

Weight, pounds: 76.5.

Type: Core made of round tubes with hexagonal ends.

Water capacity of whole system: 15 gallons, approximately.

#### EXHAUST PIPES.

Description: Short individual stacks to each cylinder.

#### LUBRICATION.

Capacity oil tank: 5.8 U. S. gallons.

Dimensions oil tank: 30 by 17 by 2½ inches.

Oil used (brand): Liberty.

Oil pressure: 55 to 60 pounds per square inch.

Oil temperature: 60°.

Type pump: Gear.

Wet or dry sump: Dry sump.

Description lubrication system: Gear driven pump forces oil to main bearings and camshaft bearings, and by spray to cylinder walls.

#### FUEL SYSTEM.

Number of tanks: 2.

Location: Main, between pilot and engine; gravity, center section upper wing.

Capacity, main, pounds: 45 gallons or 270 pounds.

Capacity, reserve: 6 gallons or 36 pounds.

Material: Terne plate.

Description of fuel supply system: Sylphon pump from main tank to gravity tank, by gravity to carburetor.

#### ENGINE CONTROL.

Description: Throttle lever and switch.

#### PROPELLER.

Make: Engineering division.

Number of blades: 2.

Diameter: 8 feet 6 inches.

Pitch: 7.10.

Tips: Terne plate.

Clearance: 10 inches.

Manufacturing number: ———.

A. S. No.: 109607.

Remarks: X-14319, 01401.

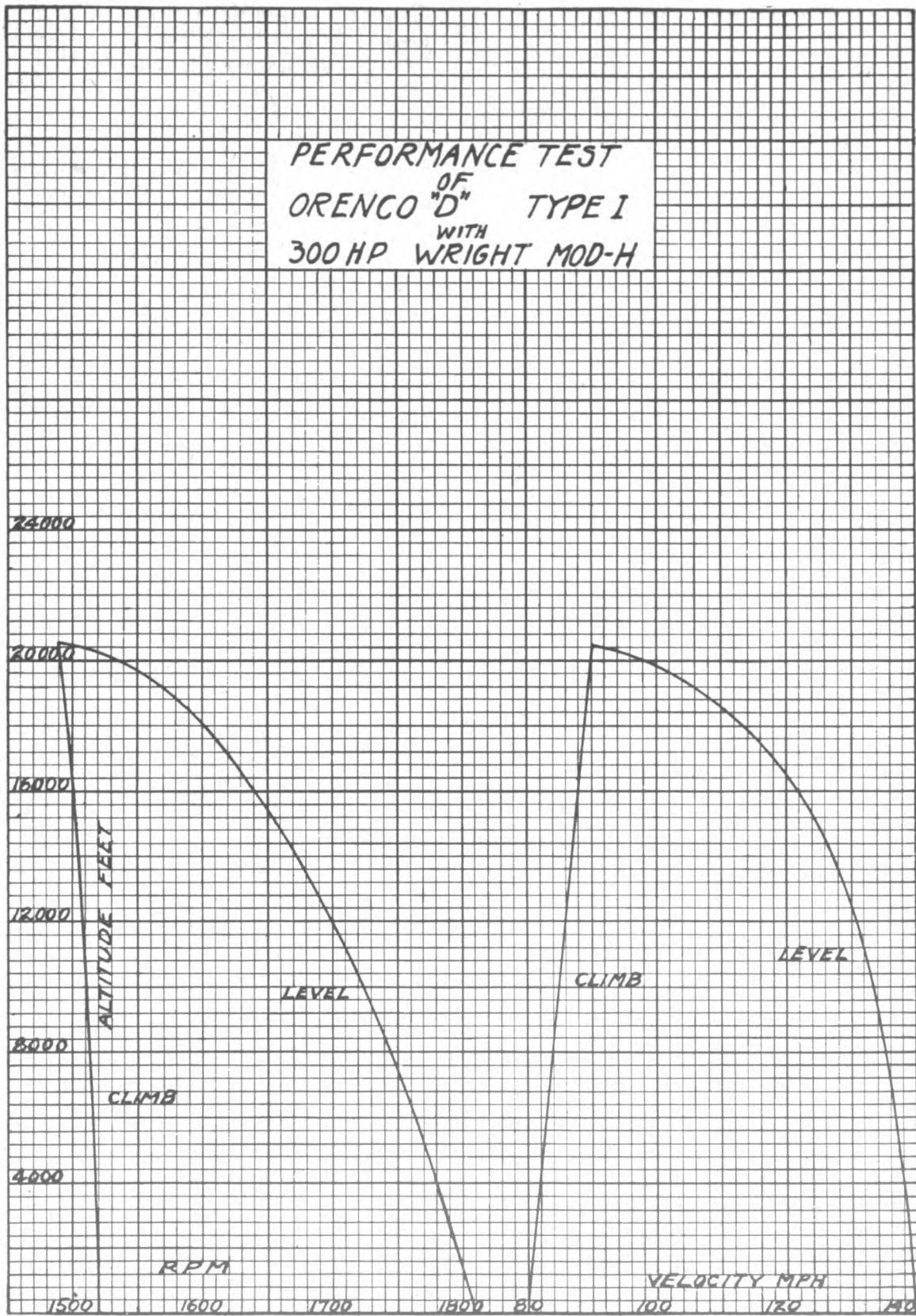


FIG. 1.

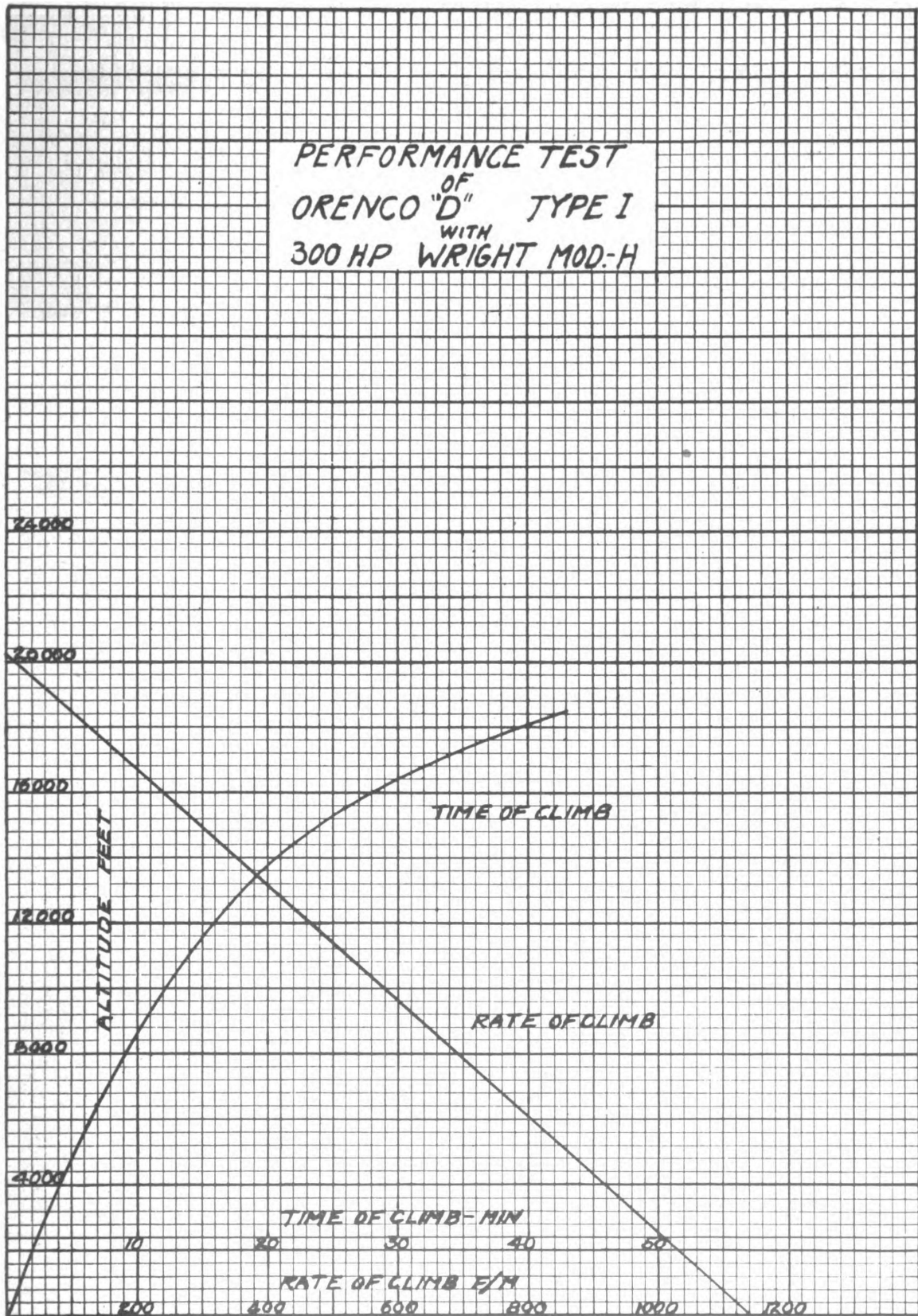


FIG. 2.

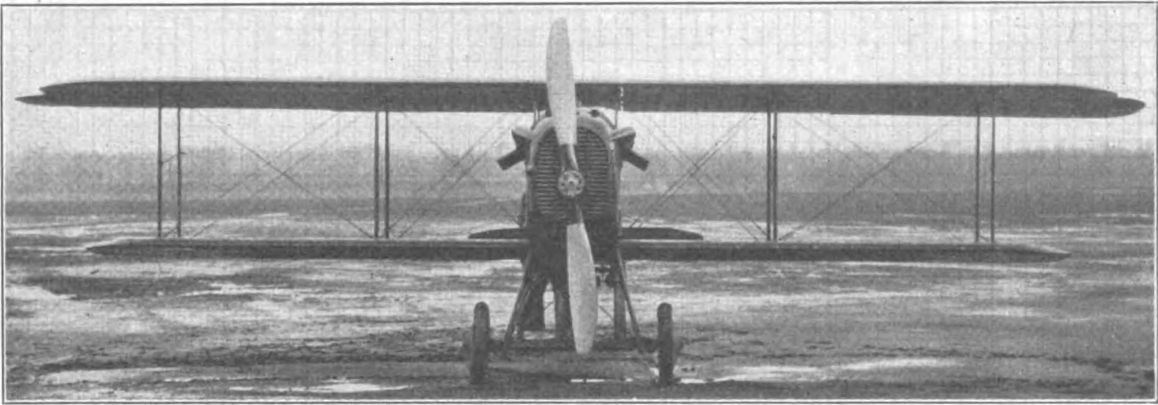


FIG. 3.—Front view.



FIG. 4.—Three-quarter front view.

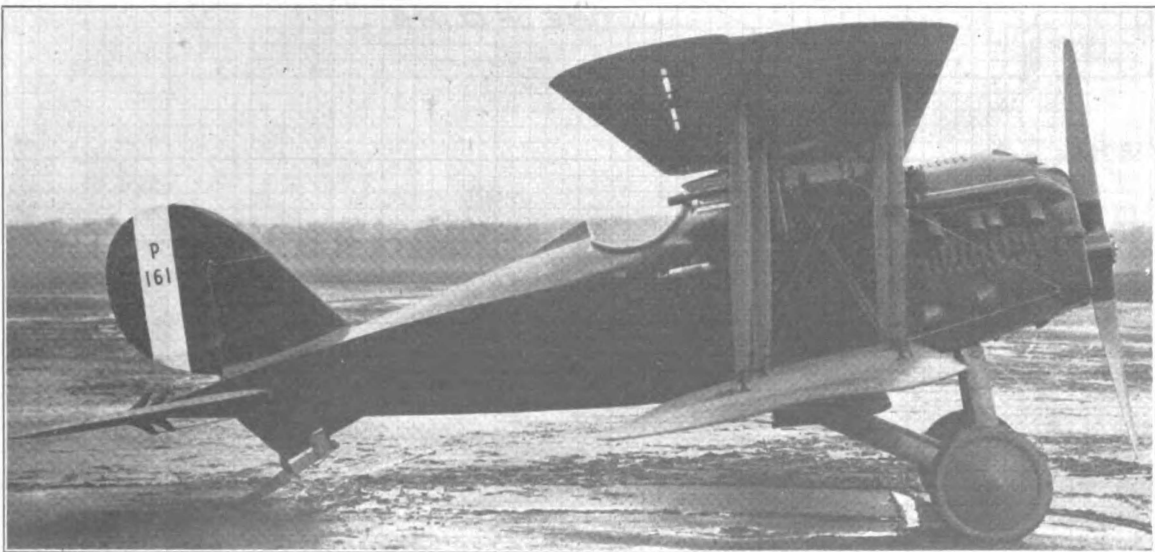


FIG. 5.—Side view.